

# Buzzards Bay Coalition

Baywatchers -Citizen's Water Quality Monitoring Program

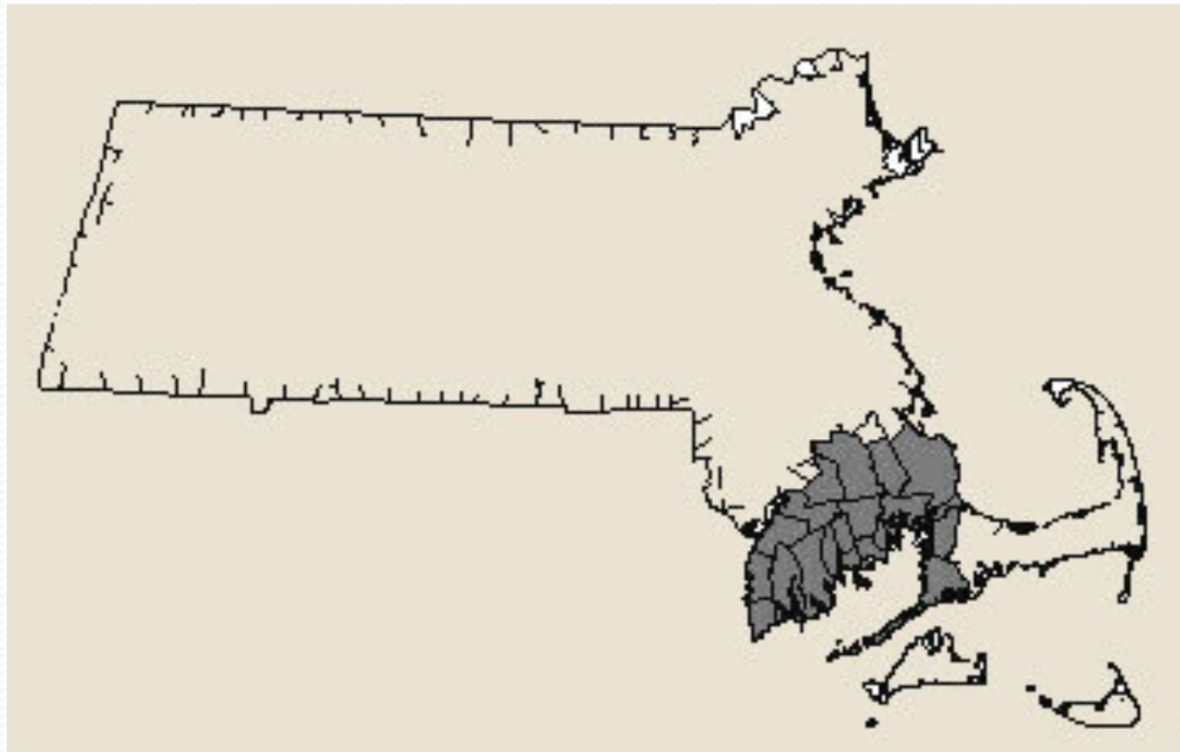
Tony Williams

Director of Monitoring Programs



# Buzzards Bay

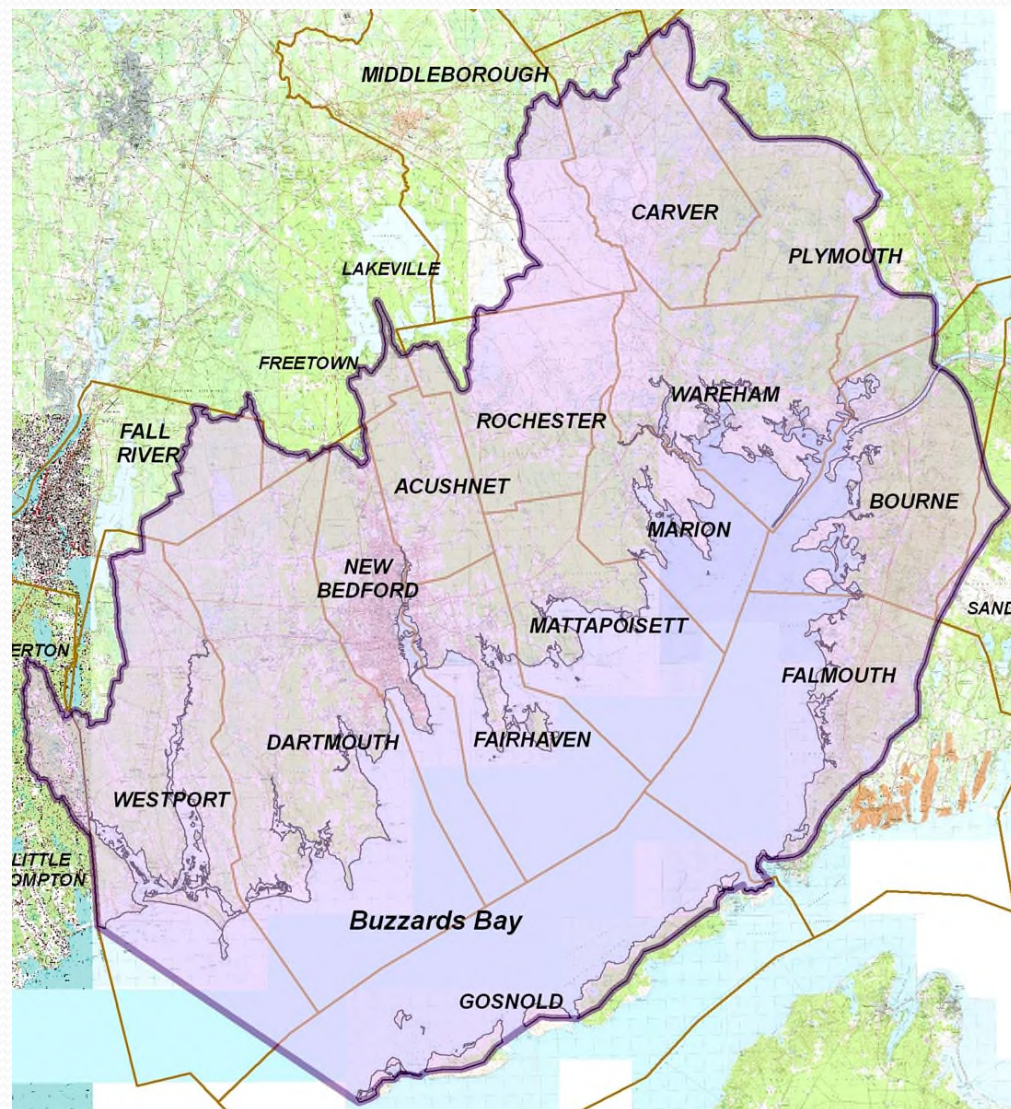
- Located in southeastern Massachusetts





# Buzzards Bay Estuary and Watershed

- Contains all or parts of 17 towns.
- 50% undeveloped,
- 25% developed,
- 25% protected open space.
- Approx. 360,000 people reside in the watershed.



Map by Buzzards Bay National Estuary Program



# The Buzzards Bay Coalition

## History

- 1985- Buzzards Bay designated by Congress as an *estuary of national significance*.
- Buzzards Bay National Estuary Program
- 1987 – The Coalition for Buzzards Bay is created.





# The Buzzards Bay Coalition

We are a member-supported, non-profit organization dedicated to the restoration, protection and sustainable use and enjoyment of our irreplaceable Bay and its watershed.





# The Buzzards Bay Coalition

## History

- 1992 – Baywatchers program created
- 1998 – Bay Lands Center formed
- 2010 – Education and Public Engagement department created.



# Baywatchers

- Citizen monitoring program initiated in 1992
- Operates at over 200 stations in 30 harbors & coves
- Has involved more than 800 volunteers

Two key goals:

- Evaluate water quality and long term ecological health
- Educate citizens on local water quality and environmental management issues



# Baywatchers

- Coalition staff train ~130 volunteers to measure dissolved oxygen, temp, salinity, and water clarity and to collect nutrient samples
- Basic water quality testing performed every ~5 days in the summer months (June to Sept)
- Nutrient and algae samples collected 4 times a summer and analyzed by Marine Biological Laboratory in Woods Hole, MA
- Largest coastal monitoring effort in MA
- Methods approved by EPA and MA-DEP





# Baywatchers

- Provide regulators with critical info on water quality-initiating 303(d) listing and TMDL reporting
- Track trends in nutrient pollution impacts in 30 major harbors
- Educate the community on Bay health and their impacts
- Give managers, students and researchers water quality data to guide restoration and protection and research on Bay and habitats





# Baywatchers

- Calibration of gear, equipment, people



buzzards  
**BAY**  
COALITION



# Baywatchers

- Citizen Scientist



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# Baywatchers



## Baywatchers

Buzzards Bay Citizens' Water Quality Monitoring Program

### 2016 Volunteer Training Schedule

Training usually takes between 60-90 minutes for everyone to review sampling methods, calibrate equipment, answer questions and give out supplies (new test kit chemicals and data sheets). You can attend any session that is most convenient for you. If you cannot make any of these sessions, please call or email to arrange a time so we can get you all the supplies and review the sampling procedure.



Date	Time	Location
Wednesday, May 11	9:00am	Westport River Watershed Alliance office (primarily for Westport River monitors)
Tuesday, May 17	8:30am	Mattapoisett Town Pier
Tuesday, May 17	5:00pm	Besse Park dock, Wareham River (Near Rt. 6 Bridge, Narrows)
Wednesday, May 25	10:00am	Lloyd Center for Environmental Studies, S. Dartmouth
Thursday, May 26	5:00pm	West Falmouth Harbor, Town Dock, Dock Rd.
Thursday, June 2	5:00pm	Buzzards Bay Center, 114 Front Street, New Bedford

If you have your kit, please bring it so we can test it. Tony will be giving out kits, new chemicals, data sheets, tide charts, and the 2016 sampling schedule. All volunteers will perform a dissolved oxygen analysis and Tony will check equipment. It is important that everyone review the sampling techniques each year for our EPA and state-approved monitoring plan.

Looking forward to another great summer. Thanks again for your help.

#### Contact:

Tony Williams, Director of Monitoring  
(508) 999-6363 ext. 203  
williams@savebuzzardsbay.org  
[www.savebuzzardsbay.org/Baywatchers](http://www.savebuzzardsbay.org/Baywatchers)

Discover your Buzzards Bay  
at [www.savebuzzardsbay.org](http://www.savebuzzardsbay.org)



## Baywatchers

Buzzards Bay Citizens' Water Quality Monitoring Program

### 2016 Monitoring Schedule

Basic Parameters (Dissolved Oxygen, Temperature, Salinity, Water Clarity)

All samples must be taken between 6-9am. If you cannot sample on the given date, please sample one day before or one day after the given date.

#### Date

Tuesday, May 31

Monday, June 6

Saturday, June 11

Thursday, June 16

Wednesday, June 22

Wednesday, June 29

Tuesday, July 5

Tuesday, July 5 (Nutrient Sample Day,  
11:00am-2:00)

Monday, July 11

Saturday, July 16 (Duplicate Sample Day –  
test two times)

Monday, July 18 (Nutrient Sample Day,  
10:00-1:00)

Wednesday, July 20

Thursday, July 28

Monday, August 1 (Nutrient Sample Day,  
9:30-12:30)

Wednesday, August 3

Tuesday, August 9

Monday, August 15 (Nutrient Sample Day,  
8:30-11:30am)

Tuesday, August 16

Saturday, August 20

Thursday, August 25

Wednesday, August 31

Wednesday, September 7

Tuesday, September 13

Saturday, September 17

Tuesday, September 20

Saturday, September 24

\*If you cannot sample on a scheduled date or on the alternate date, please ask Tony or another volunteer to cover your site.

\*\*If you get an oxygen value below 3 mg/L or a really unusual number of drops counted, please re-sample and record it on your data sheet. Please notify us and try to re-sample the next morning to see if the level persists.

\*\*\*If your thermometer and temps seem off, bring your thermometer in for us to recheck it.

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# Bay Health Index

- Bay Health Index measures the nutrient-related health water quality
- Developed using monitoring data collected through the Baywatchers program,
- Simplify results and provides a yearly snapshot of summertime conditions throughout the Bay.



# Bay Health Index

- The Bay Health Index is the sum of five individual health scores: nitrogen (organic and inorganic), water clarity, dissolved oxygen, and algal pigments. Results are combined and reported as a score and a chart that indicates the overall health at that location.
- The Bay Health Index does not include bacteria and is not an index of swimmability or shellfish bed status.





# Bay Health Index

## Calculating the Bay Health Index

Annual averages of 5 parameters are combined to produce a Bay Health Index score from 0 to 100:

Parameter	0 points	100 points
DO (lowest 20% of measurements)	40% sat	90% sat
Secchi disk depth	0.6 m	3 m
Chla + pheo	10 ug/L	3 ug/L
DIN	10 uM (0.14 ppm)	1 uM (0.014 ppm)
TON	43 uM (0.6 ppm)	20 uM (0.28 ppm)





# Bay Health Index

What does my Bay Health score mean?



0-35

**Poor**

There is too much nitrogen pollution in the water. Underwater habitats are unhealthy for fish and shellfish. The waterway is not functioning as a viable ecosystem.



35-65

**Fair**

These are transitional areas that are either improving or, more likely, becoming more polluted with nitrogen. The habitat health is damaged.



65-100

**Good**

There is little or no nitrogen pollution in the water. The waterway offers healthy underwater habitats for fish and shellfish. Overall, the ecosystem is in balance.

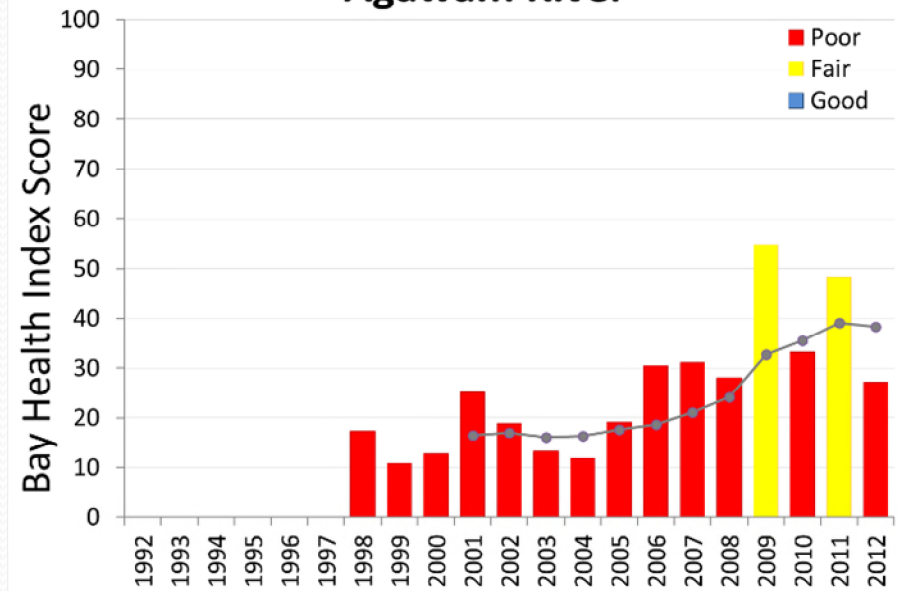


# Baywatchers

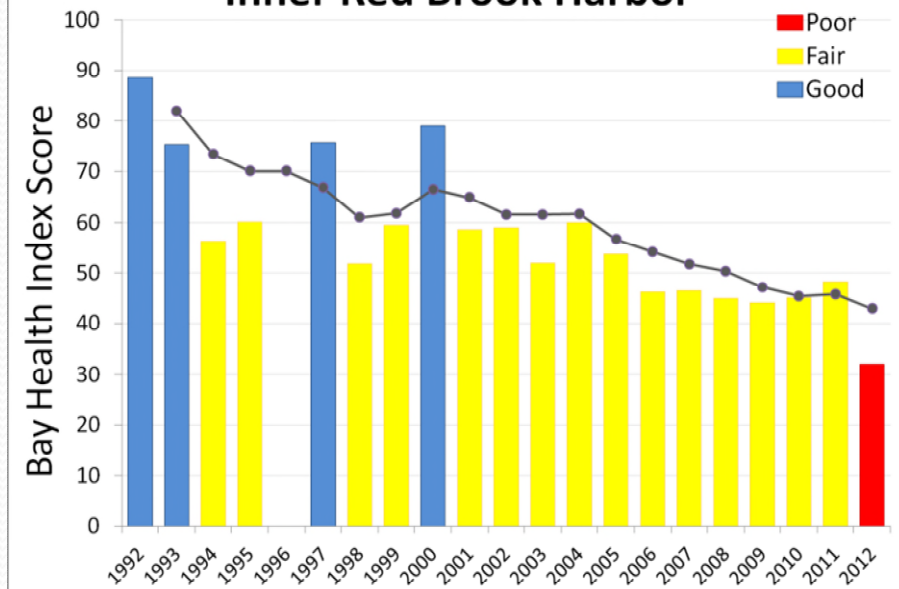
- Baywatchers data captures changes in embayment health over time



## Agawam River



## Inner Red Brook Harbor





# Results

- Bay Health trends, changes over time
- Education
- Data to action
- Restoration
- Protection



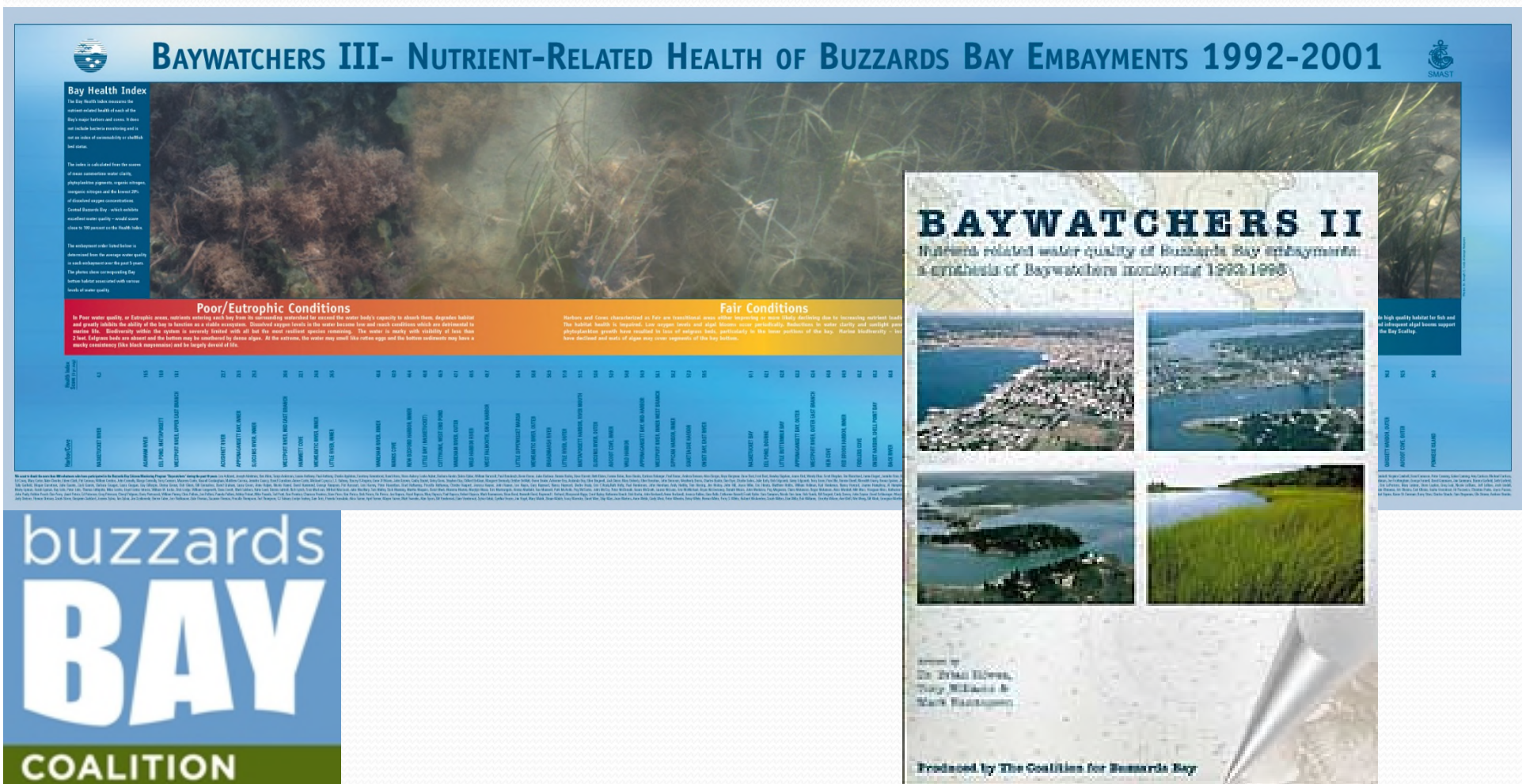
# Results

- Changes in water quality health- 5yr avg. trends

Embayment	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Quisset Harbor, Inner	54	71	66	71	71	71	74	73	76	81	77	73	71	69	65	66	74	76	80	80	75	75	81	
Quisset Harbor, Outer	59	53	51	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	
Little Spivey Marsh									58	50	51	46	49	45	43	40	42	41	43	45	43	42	44	
Meshapaqu Creek																								
West Falmouth, Snug Harbor	64	62	62	65	64	60	60	58	54	50	52	53	44	42	40									
West Falmouth, Harbor Dock	79	74	89	63	67	66	67	72	77	76	74	74	67	67	60	58	55	57	52	55	53	53	52	
West Falmouth, Mid-Harbor	77	77	73	74	76	77	75	76	76	75	68	72	63	66	61	64	67	72	66	64	58	60	60	
West Falmouth, Harbor Head	63	61	59	62	63	59	54	57	54	50	50	53	50	52	52	54	54	49	46	40	36	39	39	
West Falmouth, Outer Harbor	87	84	79	80	79	77	78	80	82	84	86	88	88	87	80	81	79	75	66	62	61	61	61	
West Falmouth, Oyster Pond				59	57	58	60	59	57	57	52	48	44	43	41	41	39	40	39	37	37	36	35	
Herring Brook																								
Wild Harbor									55	56	55	53	48	50	47	43	44	48	43	48	51	50	47	53
Wild Harbor River									49	49	49	50	48	50	48	42	38	40	37	37	36	39	39	
Fiddlers Cove									59	67	65	66	64	67	61	61	60	61	59	61	60	57	57	60
Rands Harbor									82	79	76	76	73	71	68	58	51	47	43	41	44	42	42	43
Squeteague Harbor									55	57	57	58	57	57	57	56	54	55	51	49	51	50	50	55
Megansett Harbor	37	39	36	33	36	64	63	65	67	81	81	79	76	75	73	70	71	66	67	66	64	64	66	
Pocasset Harbor, Inner									47	37	43	47	53	55	58	61	59	56	54	52	53	50	52	58
Pocasset Harbor, Outer									90	81	82	79	75	75	70	64	60	58	56	54	52	53	50	52
Hen Cove									66	64	60	61	59	57	62	63	60	57	59	55	54	53	50	52
Red Brook Harbor, Inner									58	62	73	70	67	61	62	67	65	62	62	57	54	52	53	55
Red Brook Harbor, Outer									87	87	79	75	75	76	71	73	78	72	69	63	65	65	64	59
Penikese River									74	72	65	61	62	62	62	68	68	65	63	60	62	58	57	49
Brianwood																								
Eel Pond, Bourne																								
Back River																								
Phinney's Harbor																								
Little Butternut Bay																								
Butternut Bay																								
Butler Cove																								
Onset Bay, Broad Muddy Cove																								
Onset Bay, East River																								
Onset Bay, Shell Point Bay																								
Onset Bay, Inner																								
Onset Bay, Outer																								
Little Harbor																								
Agawam River																								
Wareham River, Inner																								
Wareham River, Outer																								
Marks Cove																								
Broadmarsh River																								
Wewantic River, Inner																								
Wewantic River, Outer																								
Wings Cove, Inner																								
Wings Cove, Outer																								
Hammitt Cove																								
Sippican Harbor, Inner																								
Sippican Harbor, Outer																								
Blankenship Cove																								
Planting Island Cove																								
Aucoot Cove, Inner																								
Aucoot Cove, Mid-Harbor																								
Aucoot Cove, Outer																								
Hill's Cove																								
Eel Pond, Mattapoisett																								
Mattapoisett Harbor, River Mouth																								
Mattapoisett Harbor, Inner																								
Mattapoisett Harbor, Outer																								
Brant Island Cove																								
Nasketucket River																								
Little Bay																								
Nasketucket Bay																								
Acushnet River																								
New Bedford Harbor, Inner																								
Fairhaven Treatment Plant																								
New Bedford Harbor, Outer																								
Apponagansett Bay, Inner																								
Apponagansett Bay, Mid-Harbor																								
Apponagansett Bay, Outer																								
Clarks Cove, Inner																								
Clarks Cove, Outer																								
Nonquitt Marsh																								
Slocums River, Inner																								
Slocums River, Outer																								
Little River, Inner																								
Little River, Outer																								
Allens Pond																								
Westport River, Upper East Branch																								
Westport River, Inner East Branch																								
Westport River, Outer East Branch																								
Westport River, Inner West Branch																								
Westport River Inlet																								
Cuttyhunk Harbor Pond																								
Cuttyhunk, West End Pond																								
Penikese Island																								
Hadley Harbor																								
Cobb Bay Buoy																								
Manomet Bay																								
Vineyard Sound																								



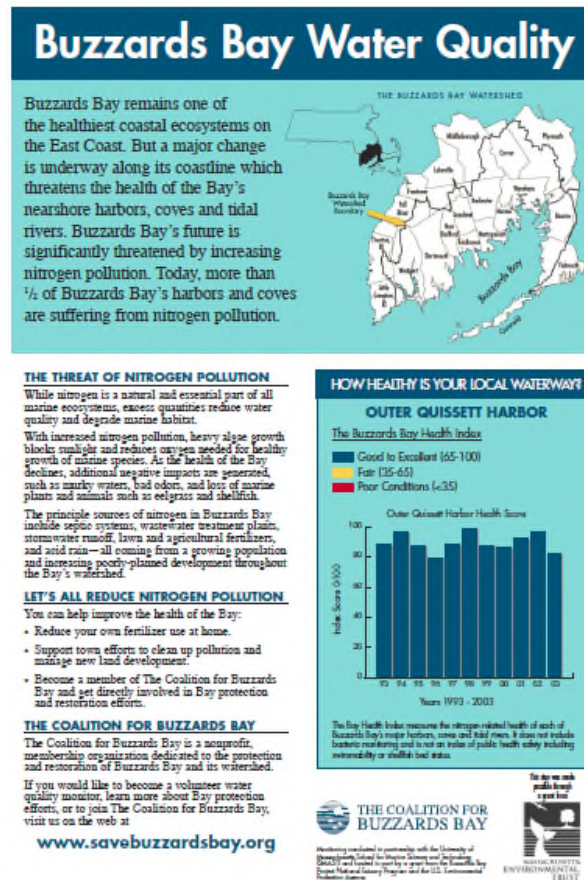
- Share results for understanding of current local water quality
- Reports, posters





# Results

- Public signage





# Results

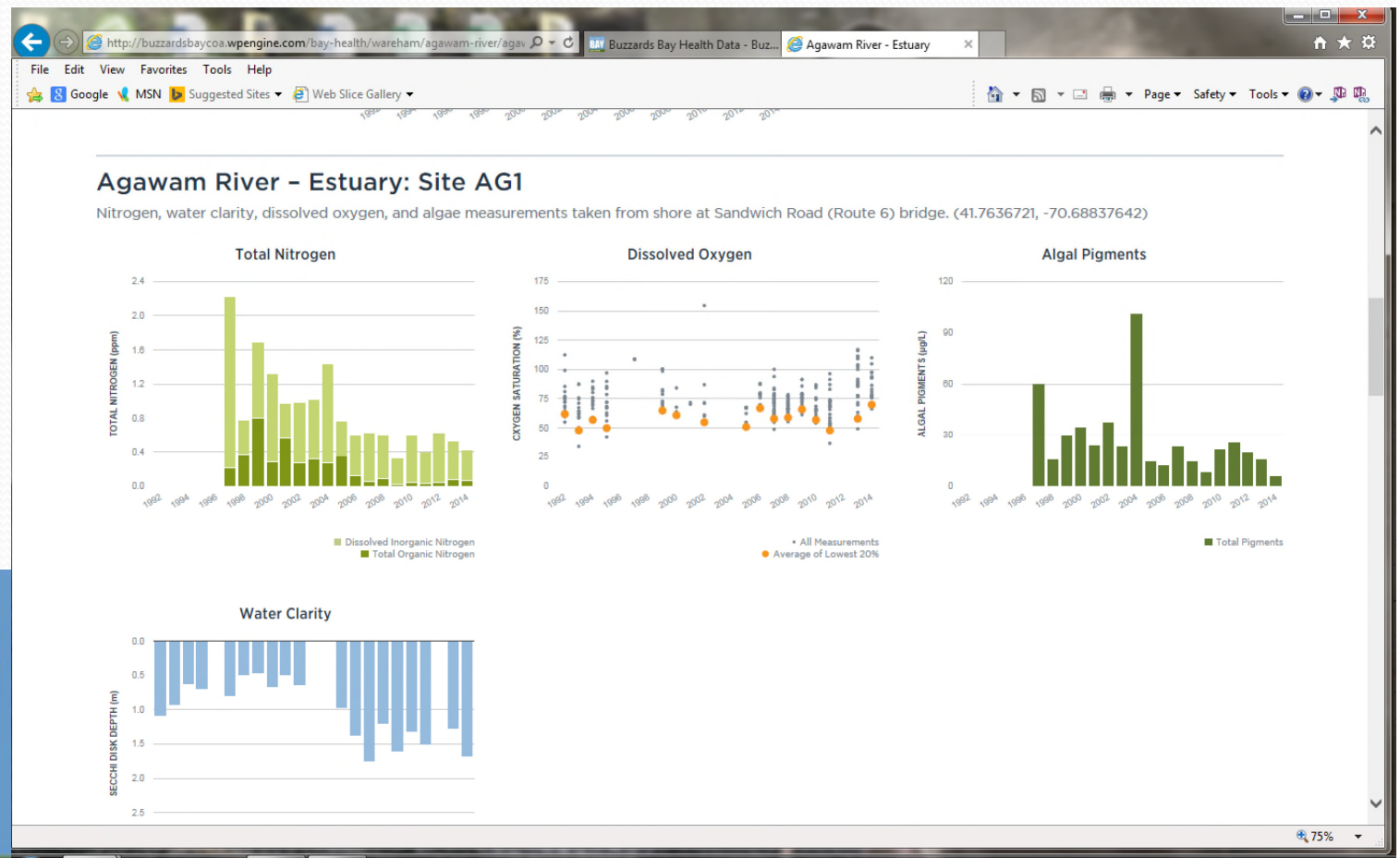
- Web site





# Results

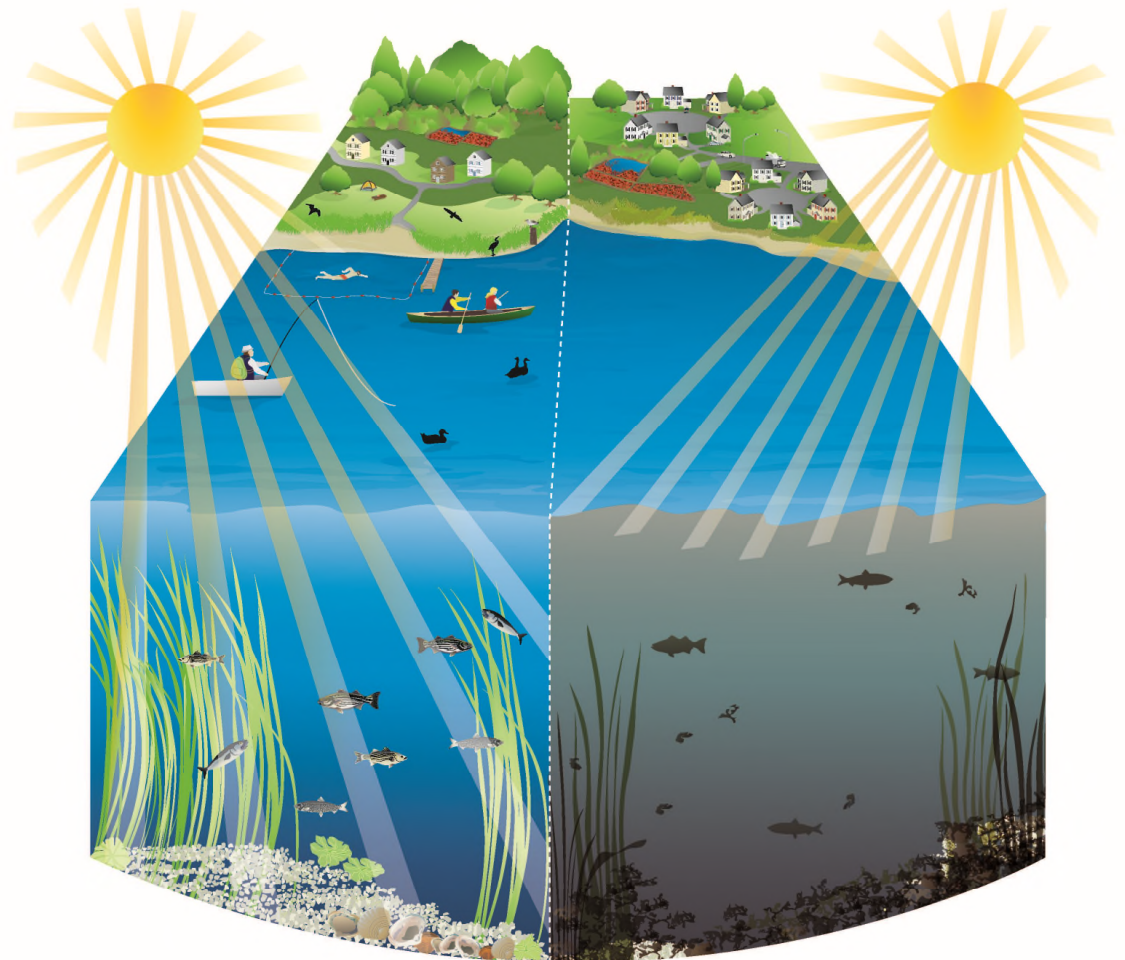
- Simple graphs





# Nitrogen – A Story of Excess

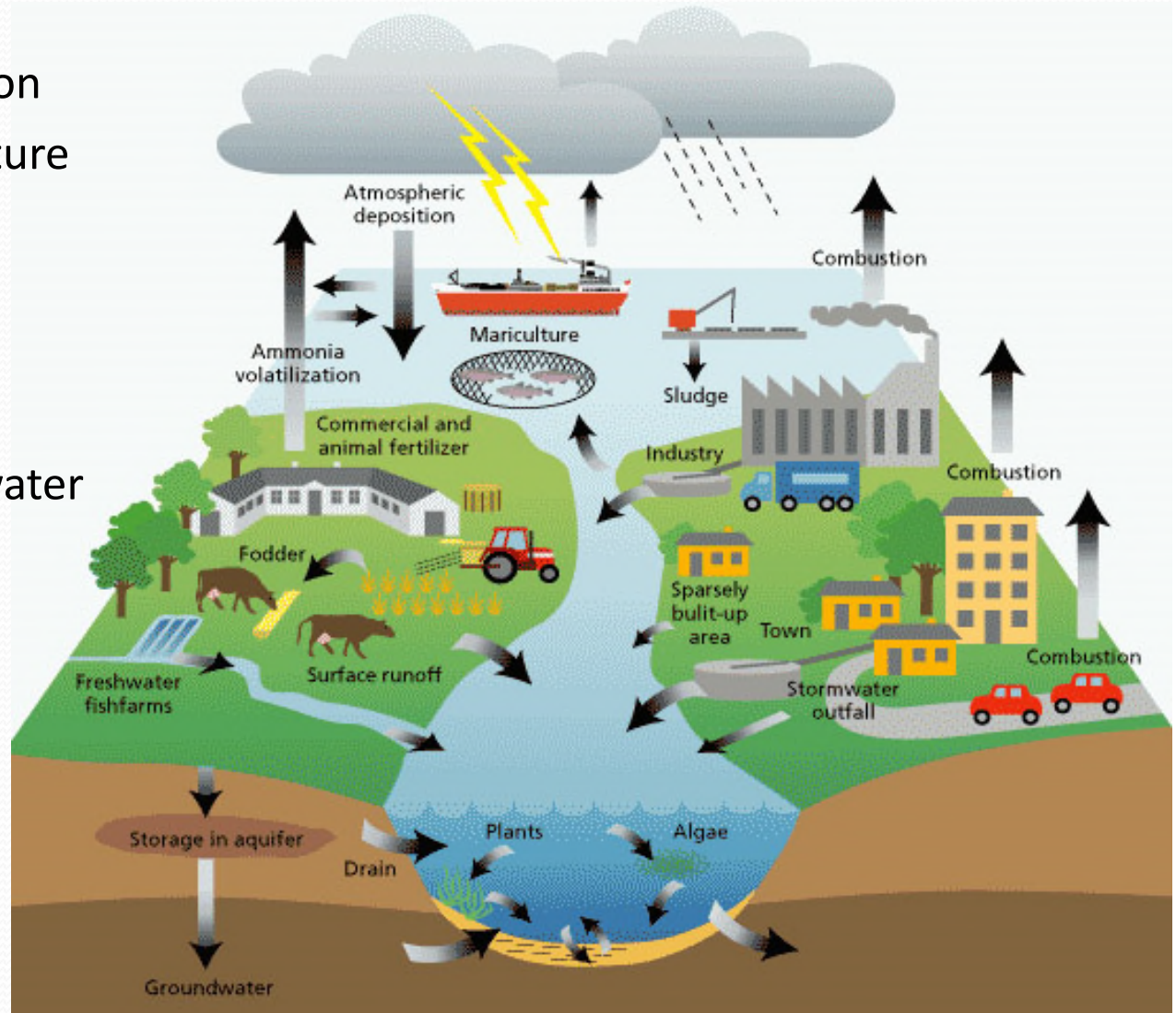
- Increase in algae blooms
- Decrease in water clarity
- Loss of underwater habitat – eelgrass
- Loss of dependent species – bay scallops
- Drop in oxygen levels
- Fish kills





# Where does Nitrogen Come From?

- Natural sources.
- Atmospheric Deposition
- Fertilizer from agriculture and homes.
- Stormwater from impervious surfaces
- Wastewater from:
  - Centralized wastewater systems – sewers.
  - Septic systems





# The State Of Buzzards Bay

- Released every four years
- Uses nine indicators to measure Bay Health
- Progress in reducing bacteria and toxics is overwhelmed by the continuing nitrogen pollution problem.





# The State Of Buzzards Bay

Coalition for-

- Science
- Conservation
- Restoration
- Advocacy
- Education



	2003	2007	2011	
<b>POLLUTION</b>				
Nitrogen	59	56	53	↓
Bacteria	59	57	62	↑
Toxics	45	47	52	↑
<b>WATERSHED HEALTH</b>				
Forests	76	75	79	↔
Streams	68	67	71	↔
Wetlands	60	60	60	↓
<b>LIVING RESOURCES</b>				
Eelgrass	34	25	23	↓
Bay Scallops	12	10	7	↓
River Herring	5	1	1	↓
<b>OVERALL SCORE</b>	48	45	45	



# The State Of Buzzards Bay

- Restoration
- Advocacy
- Education





# Baywatchers 24 Years and counting

- Baywatchers data captures changes from Nitrogen so we expect to see more algae (Chl) with more nitrogen, what about from temperature?
- Recent collaborations with Woods Hole Oceanographic Institution, the Marine Biological Laboratory and the Buzzards Bay National Estuary Program to review Baywatchers 24 years data and relationship between warmer water and nitrogen pollution.





# Community Engagement & Education

- Establish a sense of connection to the Bay and its watershed
- Inspire an ethic of stewardship for the local area and involvement in its protection





# Questions?

Tony Williams

Director of Monitoring  
Programs

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